

SEQUENCE LISTING

<110> Laura SERINO
 Rosanna LEUZZI
 Maria Rita FONTANA
 Elisabetta MONACI
 Mariagrazia PIZZA

<120> Immunogenic Compositions Comprising Multiple Gonococcal Antigens

<130> P020705.0003

<140> PCT/IB2004/002421
 <141> 2004-06-25

<150> 0315021.6
 <151> 2003-06-26

<160> 7

<170> SeqWin99, version 1.02

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 <213> Neisseria gonorrhoeae

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 Ala Leu Ser Gly Cys Val Ala Asp Pro Val Thr Gly Gln Gln Ser Pro
 20 25 30
 Asn Lys Ser Ala Met Tyr Gly Leu Gly Gly Ala Ala Val Cys Gly Ile
 35 40 45
 Val Gly Ala Leu Thr His Ser Gly Lys Gly Ala Arg Asn Ser Ala Leu
 50 55 60
 Ala Cys Gly Ala Ile Gly Ala Gly Val Gly Gly Tyr Met Asp Tyr Gln
 65 70 75 80
 Glu Gln Arg Leu Arg Gln Asn Leu Ala Gly Thr Gln Ile Glu Ile Gln
 85 90 95
 Arg Gln Gly Asn Gln Ile Arg Leu Val Met Pro Glu Ser Val Thr Phe
 100 105 110
 Ala Thr Gly Ser Ala Ala Leu Gly Gly Ser Ala Gln Tyr Ala Leu Asn
 115 120 125
 Thr Ala Ala Gln Thr Leu Val Gln Tyr Pro Asp Thr Thr Leu Thr Ile
 130 135 140

Asn Gly His Thr Asp Asn Thr Gly Ser Asp Ala Val Asn Asn Pro Leu
145 150 155 160

Ser Gln His Arg Ala Gln Ala Val Ala Tyr Tyr Leu Gln Thr Arg Gly
165 170 175

Val Ala Ala Ser Arg Leu Thr Val Tyr Gly Tyr Gly Ser His Met Pro
180 185 190

Val Ala Ser Asn Ala Thr Val Glu Gly Arg Ala Gln Asn Arg Arg Val
195 200 205

Glu Ile Leu Ile Asn Pro Asp Gln Arg Ala Val Asn Ala Ala Arg His
210 215 220

Met
225

<210> 3
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<212> PRT
<213> Neisseria gonorrhoeae

<400> 3
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Ser Phe Thr Met Ile Arg Leu Thr Arg Ala Phe Ala Ala Ala Leu Ile
20 25 30

Gly Leu Cys Cys Thr Thr Gly Ala His Ala Asp Thr Phe Gln Lys Ile
35 40 45

Gly Phe Ile Asn Thr Glu Arg Ile Tyr Leu Glu Ser Lys Gln Ala Arg
50 55 60

Asn Ile Gln Lys Thr Leu Asp Gly Glu Phe Ser Ala Arg Gln Asp Glu
65 70 75 80

Leu Gln Lys Leu Gln Arg Glu Gly Leu Asp Leu Glu Arg Gln Leu Ala
85 90 95

Gly Gly Lys Leu Lys Asp Ala Lys Lys Ala Gln Ala Glu Glu Lys Trp
100 105 110

Arg Gly Leu Val Glu Ala Phe Arg Lys Lys Gln Ala Gln Phe Glu Glu
115 120 125

Asp Tyr Asn Leu Arg Arg Asn Glu Glu Phe Ala Ser Leu Gln Gln Asn
130 135 140

Ala Asn Arg Val Ile Val Lys Ile Ala Lys Gln Glu Gly Tyr Asp Val
145 150 155 160

Ile Leu Gln Asp Val Ile Tyr Val Asn Thr Gln Tyr Asp Val Thr Asp
165 170 175

Ser Val Ile Lys Glu Met Asn Ala Arg
180 185

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<212> PRT
<213> Neisseria gonorrhoeae

<400> 4
Met Asn Thr Ile Phe Lys Ile Ser Ala Leu Thr Leu Ser Ala Ala Leu
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Ala Leu Ser Ala Cys Gly Lys Lys Glu Ala Ala Pro Ala Ser Ala Ser
20 25 30

Glu Pro Ala Ala Ala Ser Ala Ala Gln Gly Asp Thr Ser Ser Ile Gly
35 40 45

Ser Thr Met Gln Gln Ala Ser Tyr Ala Met Gly Val Asp Ile Gly Arg
50 55 60

Ser Leu Lys Gln Met Lys Glu Gln Gly Ala Glu Ile Asp Leu Lys Val
65 70 75 80

Phe Thr Asp Ala Met Gln Ala Val Tyr Asp Gly Lys Glu Ile Lys Met
85 90 95

Thr Glu Glu Gln Ala Gln Glu Val Met Met Lys Phe Leu Gln Glu Gln
100 105 110

Gln Ala Lys Ala Val Glu Lys His Lys Ala Asp Ala Lys Ala Asn Lys
115 120 125

Glu Lys Gly Glu Ala Phe Leu Lys Glu Asn Ala Ala Lys Asp Gly Val
130 135 140

Lys Thr Thr Ala Ser Gly Leu Gln Tyr Lys Ile Thr Lys Gln Gly Glu
145 150 155 160

Gly Lys Gln Pro Thr Lys Asp Asp Ile Val Thr Val Glu Tyr Glu Gly
165 170 175

Arg Leu Ile Asp Gly Thr Val Phe Asp Ser Ser Lys Ala Asn Gly Gly
180 185 190

Pro Ala Thr Phe Pro Leu Ser Gln Val Ile Pro Gly Trp Thr Glu Gly
195 200 205

Val Arg Leu Leu Lys Glu Gly Gly Glu Ala Thr Phe Tyr Ile Pro Ser
210 215 220

Asn Leu Ala Tyr Arg Glu Gln Gly Ala Gly Glu Lys Ile Gly Pro Asn
225 230 235 240

Ala Thr Leu Val Phe Asp Val Lys Leu Val Lys Ile Gly Ala Pro Glu
245 250 255

Asn Ala Pro Ala Lys Gln Pro Asp Gln Val Asp Ile Lys Lys Val Asn
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<210> 5
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 <212> PRT
 <213> *Neisseria gonorrhoeae*

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 20 25 30
 Glu Lys Ile Gly Trp Ile Leu Val Leu Asp Lys Glu Gly Arg Leu Lys
 35 40 45
 Thr Val Val Pro Asn Leu Thr Ala Asp Lys Lys Pro Gln Pro Lys Leu
 50 55 60
 Met Ser Val Pro Arg Pro Glu Lys Arg Thr Ser Gly Ile Lys Pro Asn
 65 70 75 80
 Phe Leu Trp Asp Lys Thr Ala Tyr Ala Leu Gly Val Glu Ala Asn Lys
 85 90 95
 Asn Lys Ala Glu Ala Lys Glu Lys Pro Phe Thr Pro Ser Glu Lys Thr
 100 105 110
 Phe Glu Ala Phe Lys Gln Tyr His Leu Asp Leu Leu Gln Asn Ser Glu
 115 120 125
 Asp Glu Gly Leu Gln Ala Leu Cys Arg Phe Leu Gln Asn Trp Gln Pro
 130 135 140
 Ala His Phe Ala Ala Glu Asn Leu Pro Ala Glu Met Leu Asp Ser Asn
 145 150 155 160
 Thr Ala Phe Ser Leu Glu Lys Pro Thr Ala Leu Ile His Lys Arg Glu
 165 170 175
 Ala Ala Gln Thr Leu Trp Ala Gly Cys Leu Lys Ser Asp Glu Ala Leu
 180 185 190
 Glu Ser Leu Cys Leu Ile Ser Gly Asp Thr Ala Pro Ile Ala Arg Leu
 195 200 205
 His Pro Ala Ile Lys Gly Val Phe Gly Gly Gln Ser Ser Gly Gly Ser
 210 215 220
 Ile Ile Ser Phe Asn Lys Glu Ala Phe Ser Ser Phe Gly Lys Glu Gln
 225 230 235 240
 Gly Ala Asn Ala Pro Val Ser Glu Gln Ser Ala Phe Ala Tyr Thr Thr
 245 250 255
 Ala Leu Asn Tyr Leu Leu Arg Arg Glu Asn Asn His Cys Leu Thr Ile
 260 265 270
 Gly Asp Ala Ser Thr Val Phe Trp Ala Glu Ala Asp Asp Ile Val Asp
 275 280 285

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 <213> *Neisseria gonorrhoeae*

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 Leu Ile Val Arg Ser His Tyr Arg Trp Thr Tyr Phe Phe Ala Ser Ala
 20 25 30
 Leu Phe Val Phe Leu Ala Gly Gly Met Leu Met Leu Thr Ala Gln Trp
 35 40 45
 Gln Arg Ala Leu Asn Phe Ala Ser Val Trp Phe Val Val Leu Ile Leu
 50 55 60
 Phe His Arg Leu Lys Ile His Tyr Tyr Lys Gln Pro Leu Leu Ile Ser
 65 70 75 80
 Asp Phe Leu Leu Ile Ala Asp Trp Arg Asn Trp Glu Thr Leu Phe His
 85 90 95
 Tyr Lys Glu Ala Val Ile Gly Met Ala Gly Leu Leu Ala Leu Ala Gly
 100 105 110
 Tyr Ala Val Phe Gly Trp Ser Gly Ala Asp Ser Leu Gly Met Pro Trp
 115 120 125
 Arg Trp Ala Gly Ala Val Leu Phe Ala Ala Ala Phe Val Ser Val Arg
 130 135 140
 His Phe Ser Lys His Pro Gly Ala Val Lys Thr Trp Leu Asp Ser Leu
 145 150 155 160
 Pro Asp Asp Gly Arg Asp Val Phe Leu Asn Leu Pro Met Ser Cys Arg
 165 170 175
 Ala Val Phe Phe Gln Val Pro Val Phe Glu Gly Asp Gly Glu Ala Phe
 180 185 190
 Ala Arg Gln Met Pro Ser Glu Thr Arg Pro Tyr Gly Met Ser Asp Glu
 195 200 205
 Lys Pro Asp Ile Val Val Thr Leu Met Glu Ser Thr Leu Asp Pro His
 210 215 220
 Cys Phe Asp Phe Ala Ala Ala Lys Ile Pro Asp Leu Lys Met Phe Gly
 225 230 235 240
 Arg Gln Glu Asp Thr Val Phe Ser Ser Pro Leu Arg Val His Thr Phe
 245 250 255
 Gly Gly Ala Thr Trp Lys Ser Glu Phe Ala Phe Leu Ala Gly Val Pro
 260 265 270
 Ser Thr Asp Phe Gly Ala Leu Ala Ser Gly Val Phe Tyr Ser Val Val
 275 280 285

Pro His Leu Gln Thr Gly Phe Val Arg Asn Leu Arg Glu His Gly Tyr
 290 295 300
 Phe Cys Val Ala Leu Ser Pro Phe Thr Lys Gly Asn Tyr Asn Ala Lys
 305 310 315 320
 Ala Ala Tyr Asp His Phe Gly Phe Asn Leu Met Phe Gln Pro Gln Asp
 325 330 335
 Leu Gly Tyr Pro Ala Pro Met Gly Lys Asn Leu Trp His Ile Ser Ser
 340 345 350
 Glu Glu Met Met Gln Tyr Ala Arg Met Ile Leu Glu Lys Arg His Pro
 355 360 365
 Asp Leu Glu Asn Val Arg Gln Pro Met Phe Val Tyr Val Leu Thr Met
 370 375 380
 Lys Glu His Gly Pro Tyr Arg Thr Asp Thr Asp Asn Val Phe Asp Leu
 385 390 395 400
 Asp Ala Pro Asp Leu Asn Ala Lys Thr Val Ser Ala Leu Asn Asp Tyr
 405 410 415
 Ile Gly Arg Ile Ala Asp Leu Asp Lys Ala Val Glu Ser Phe Asp Arg
 420 425 430
 Tyr Leu His Glu Arg Gly Lys Pro Phe Val Phe Gly Tyr Phe Gly Asp
 435 440 445
 His Gln Val Pro Phe Glu Gly Val Ser Val Arg Lys Lys Trp Asp Tyr
 450 455 460
 Ala Gln Pro Asp Tyr Val Thr Gln Phe Ala Val Arg Ser Asn Ile Ala
 465 470 475 480
 Gly Gly Phe Val Gln Arg Gln Asp Phe Leu Asp Leu Ala Phe Ala Gly
 485 490 495
 Gly Val Leu Met Glu Ala Ala Gly Leu Glu Ala Lys Asp Gly Phe Met
 500 505 510
 Arg Ala Asn Met Ala Met Arg Gly Leu Cys Gly Gly Gly Leu Glu Asp
 515 520 525
 Cys Pro Asn Arg Glu Leu Val Gly Asn Tyr Arg Asn Tyr Leu Tyr Asp
 530 535 540
 Val Leu Lys Ile Ala Arg
 545 550

<210> 7
 <211> 1468
 <212> PRT
 <213> *Neisseria gonorrhoeae*

<400> 7
 Met Lys Thr Thr Asp Lys Arg Thr Thr Glu Thr His Arg Lys Ala Pro
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 Lys Thr Gly Arg Ile Arg Phe Ser Pro Ala Tyr Leu Ala Ile Cys Leu
 20 25 30
 Ser Phe Gly Ile Leu Pro Gln Ala Arg Ala Gly His Thr Tyr Phe Gly
 35 40 45
 Ile Asn Tyr Gln Tyr Tyr Arg Asp Phe Ala Glu Asn Lys Gly Lys Phe
 50 55 60
 Ala Val Gly Ala Lys Asp Ile Glu Val Tyr Asn Lys Lys Gly Glu Leu
 65 70 75 80
 Val Gly Lys Ser Met Thr Lys Ala Pro Met Ile Asp Phe Ser Val Val
 85 90 95
 Ser Arg Asn Gly Val Ala Ala Leu Ala Gly Asp Gln Tyr Ile Val Ser
 100 105 110
 Val Ala His Asn Gly Gly Tyr Asn Asn Val Asp Phe Gly Ala Glu Gly
 115 120 125
 Ser Asn Pro Asp Gln His Arg Phe Ser Tyr Gln Ile Val Lys Arg Asn
 130 135 140
 Asn Tyr Lys Ala Gly Thr Asn Gly His Pro Tyr Gly Gly Asp Tyr His
 145 150 155 160
 Met Pro Arg Leu His Lys Phe Val Thr Asp Ala Glu Pro Val Glu Met
 165 170 175
 Thr Ser Tyr Met Asp Gly Trp Lys Tyr Ala Asp Leu Asn Lys Tyr Pro
 180 185 190
 Asp Arg Val Arg Ile Gly Ala Gly Arg Gln Tyr Trp Arg Ser Asp Glu
 195 200 205
 Asp Glu Pro Asn Asn Arg Glu Ser Ser Tyr His Ile Ala Ser Ala Tyr
 210 215 220
 Ser Trp Leu Val Gly Gly Asn Thr Phe Ala Gln Asn Gly Ser Gly Gly
 225 230 235 240
 Gly Thr Val Asn Leu Gly Ser Glu Lys Ile Lys His Ser Pro Tyr Gly
 245 250 255
 Phe Leu Pro Thr Gly Gly Ser Phe Gly Asp Ser Gly Ser Pro Met Phe
 260 265 270
 Ile Tyr Asp Ala Gln Lys Gln Lys Trp Leu Ile Asn Gly Val Leu Gln
 275 280 285

Thr	Gly	Asn	Pro	Tyr	Ile	Gly	Lys	Ser	Asn	Gly	Phe	Gln	Leu	Val	Arg		
290						295					300						
Lys	Asp	Trp	Phe	Tyr	Asp	Glu	Ile	Phe	Ala	Gly	Asp	Thr	His	Ser	Val		
305					310					315					320		
Phe	Tyr	Glu	Pro	His	Gln	Asn	Gly	Lys	Tyr	Phe	Phe	Asn	Asp	Asn	Asn		
				325					330					335			
Asn	Gly	Ala	Gly	Lys	Ile	Asp	Ala	Lys	His	Lys	His	Tyr	Ser	Leu	Pro		
			340					345					350				
Tyr	Arg	Leu	Lys	Thr	Arg	Thr	Val	Gln	Leu	Phe	Asn	Val	Ser	Leu	Ser		
		355					360					365					
Glu	Thr	Ala	Arg	Glu	Pro	Val	Tyr	His	Ala	Ala	Gly	Gly	Val	Asn	Ser		
	370					375					380						
Tyr	Arg	Pro	Arg	Leu	Asn	Asn	Gly	Glu	Asn	Ile	Ser	Phe	Ile	Asp	Lys		
385					390					395					400		
Gly	Lys	Gly	Glu	Leu	Ile	Leu	Thr	Ser	Asn	Ile	Asn	Gln	Gly	Ala	Gly		
				405					410					415			
Gly	Leu	Tyr	Phe	Glu	Gly	Asn	Phe	Thr	Val	Ser	Pro	Lys	Asn	Asn	Glu		
			420					425					430				
Thr	Trp	Gln	Gly	Ala	Gly	Val	His	Ile	Ser	Asp	Gly	Ser	Thr	Val	Thr		
		435					440					445					
Trp	Lys	Val	Asn	Gly	Val	Ala	Asn	Asp	Arg	Leu	Ser	Lys	Ile	Gly	Lys		
	450					455					460						
Gly	Thr	Leu	Leu	Val	Gln	Ala	Lys	Gly	Glu	Asn	Gln	Gly	Ser	Val	Ser		
465					470					475					480		
Val	Gly	Asp	Gly	Lys	Val	Ile	Leu	Asp	Gln	Gln	Ala	Asp	Asp	Gln	Gly		
				485					490					495			
Lys	Lys	Gln	Ala	Phe	Ser	Glu	Ile	Gly	Leu	Val	Ser	Gly	Arg	Gly	Thr		
			500					505					510				
Val	Gln	Leu	Asn	Ala	Asp	Asn	Gln	Phe	Asn	Pro	Asp	Lys	Leu	Tyr	Phe		
		515					520					525					
Gly	Phe	Arg	Gly	Gly	Arg	Leu	Asp	Leu	Asn	Gly	His	Ser	Leu	Ser	Phe		
	530					535					540						
His	Arg	Ile	Gln	Asn	Thr	Asp	Glu	Gly	Ala	Met	Ile	Val	Asn	His	Asn		
545					550					555					560		
Gln	Asp	Lys	Glu	Ser	Thr	Val	Thr	Ile	Thr	Gly	Asn	Lys	Asp	Ile	Thr		
				565					570					575			
Thr	Thr	Gly	Asn	Asn	Asn	Asn	Leu	Asp	Ser	Lys	Lys	Glu	Ile	Ala	Tyr		
				580				585					590				
Asn	Gly	Trp	Phe	Gly	Glu	Lys	Asp	Ala	Thr	Lys	Thr	Asn	Gly	Gly	Leu		
		595					600						605				

Asn	Leu	Asn	Tyr	Pro	Pro	Glu	Glu	Ala	Asp	Arg	Thr	Leu	Leu	Leu	Ser	610	615	620
Gly	Gly	Thr	Asn	Leu	Asn	Gly	Asn	Ile	Thr	Gln	Thr	Asn	Gly	Lys	Leu	625	630	635
Phe	Phe	Ser	Gly	Arg	Pro	Thr	Pro	His	Ala	Tyr	Asn	His	Leu	Gly	Ser	645	650	655
Gly	Trp	Ser	Lys	Met	Glu	Gly	Ile	Pro	Gln	Gly	Glu	Ile	Val	Trp	Asp	660	665	670
Asn	Asp	Trp	Ile	Asp	Arg	Thr	Phe	Lys	Ala	Glu	Asn	Phe	His	Ile	Gln	675	680	685
Gly	Gly	Gln	Ala	Val	Val	Ser	Arg	Asn	Val	Ala	Lys	Val	Glu	Gly	Asp	690	695	700
Trp	His	Leu	Ser	Asn	His	Ala	Gln	Ala	Val	Phe	Gly	Val	Ala	Pro	His	705	710	715
Gln	Ser	His	Thr	Ile	Cys	Thr	Arg	Ser	Asp	Trp	Thr	Gly	Leu	Thr	Ser	725	730	735
Cys	Thr	Glu	Lys	Thr	Ile	Thr	Asp	Asp	Lys	Val	Ile	Ala	Ser	Leu	Ser	740	745	750
Lys	Thr	Asp	Val	Arg	Gly	Asn	Val	Ser	Leu	Ala	Asp	His	Ala	His	Leu	755	760	765
Asn	Leu	Thr	Gly	Leu	Ala	Thr	Phe	Asn	Gly	Asn	Leu	Val	Gln	Ala	Glu	770	775	780
Thr	Arg	Thr	Ile	Arg	Leu	Arg	Ala	Asn	Ala	Thr	Gln	Asn	Gly	Asn	Leu	785	790	795
Ser	Leu	Val	Gly	Asn	Ala	Gln	Ala	Thr	Phe	Asn	Gln	Ala	Thr	Leu	Asn	805	810	815
Gly	Asn	Thr	Ser	Ala	Ser	Asp	Asn	Ala	Ser	Phe	Asn	Leu	Ser	Asn	Asn	820	825	830
Ala	Val	Gln	Asn	Gly	Ser	Leu	Thr	Leu	Ser	Asp	Asn	Ala	Lys	Ala	Asn	835	840	845
Val	Ser	His	Ser	Ala	Leu	Asn	Gly	Asn	Val	Ser	Leu	Ala	Asp	Lys	Ala	850	855	860
Val	Phe	His	Phe	Glu	Asn	Ser	Arg	Phe	Thr	Gly	Lys	Ile	Ser	Gly	Gly	865	870	875
Lys	Asp	Thr	Ala	Leu	His	Leu	Lys	Asp	Ser	Glu	Trp	Thr	Leu	Pro	Ser	885	890	895
Gly	Thr	Glu	Leu	Gly	Asn	Leu	Asn	Leu	Asp	Asn	Ala	Thr	Ile	Thr	Leu	900	905	910
Asn	Ser	Ala	Tyr	Arg	His	Asp	Ala	Ala	Gly	Ala	Gln	Thr	Gly	Ser	Ala	915	920	925

Ala Asp Ala Pro Arg Arg Arg Ser Arg Arg Ser Leu Leu Ser Val Thr
 930 935 940
 Pro Pro Thr Ser Ala Glu Ser Arg Phe Asn Thr Leu Thr Val Asn Gly
 945 950 955 960
 Lys Leu Asn Gly Gln Gly Thr Phe Arg Phe Met Ser Glu Leu Phe Gly
 965 970 975
 Tyr Arg Ser Gly Lys Leu Lys Leu Ala Glu Ser Ser Glu Gly Thr Tyr
 980 985 990
 Thr Leu Ala Val Asn Asn Thr Gly Asn Glu Pro Val Ser Leu Glu Gln
 995 1000 1005
 Leu Thr Val Val Glu Gly Lys Asp Asn Thr Pro Leu Ser Glu Asn Leu
 1010 1015 1020
 Asn Phe Thr Leu Gln Asn Glu His Val Asp Ala Gly Ala Trp Arg Tyr
 1025 1030 1035 1040
 Gln Leu Ile Arg Lys Asp Gly Glu Phe Arg Leu His Asn Pro Val Lys
 1045 1050 1055
 Glu Gln Glu Leu Ser Asp Lys Leu Gly Lys Ala Gly Glu Thr Glu Ala
 1060 1065 1070
 Ala Leu Thr Ala Lys Gln Ala Gln Leu Ala Ala Lys Gln Gln Ala Glu
 1075 1080 1085
 Lys Asp Asn Ala Gln Ser Leu Asp Ala Leu Ile Ala Ala Gly Arg Asn
 1090 1095 1100
 Ala Thr Glu Lys Ala Glu Ser Val Ala Glu Pro Ala Arg Gln Ala Gly
 1105 1110 1115 1120
 Gly Glu Asn Ala Gly Ile Met Gln Ala Glu Glu Glu Lys Lys Arg Val
 1125 1130 1135
 Gln Ala Asp Lys Asp Thr Ala Leu Ala Lys Gln Arg Glu Ala Glu Thr
 1140 1145 1150
 Arg Pro Ala Thr Thr Ala Phe Pro Arg Ala Arg Arg Ala Arg Arg Asp
 1155 1160 1165
 Leu Pro Gln Pro Gln Pro Gln Pro Gln Pro Gln Arg Asp Leu
 1170 1175 1180
 Ile Ser Arg Tyr Ala Asn Ser Gly Leu Ser Glu Phe Ser Ala Thr Leu
 1185 1190 1195 1200
 Asn Ser Val Phe Ala Val Gln Asp Glu Leu Asp Arg Val Phe Ala Glu
 1205 1210 1215
 Asp Arg Arg Asn Ala Val Trp Thr Ser Gly Ile Arg Asp Thr Lys His
 1220 1225 1230
 Tyr Arg Ser Gln Asp Phe Arg Ala Tyr Arg Gln Gln Thr Asp Leu Arg
 1235 1240 1245

Gln Ile Gly Met Gln Lys Asn Leu Gly Ser Gly Arg Val Gly Ile Leu
 1250 1255 1260
 Phe Ser His Asn Arg Thr Gly Asn Thr Phe Asp Asp Gly Ile Gly Asn
 1265 1270 1275 1280
 Ser Ala Arg Leu Ala His Gly Ala Val Phe Gly Gln Tyr Gly Ile Gly
 1285 1290 1295
 Arg Phe Asp Ile Gly Ile Ser Ala Gly Ala Gly Phe Ser Ser Gly Ser
 1300 1305 1310
 Leu Ser Asp Gly Ile Arg Gly Lys Ile Arg Arg Arg Val Leu His Tyr
 1315 1320 1325
 Gly Ile Gln Ala Arg Tyr Arg Ala Gly Phe Gly Gly Phe Gly Ile Glu
 1330 1335 1340
 Pro His Ile Gly Ala Thr Arg Tyr Phe Val Gln Lys Ala Asp Tyr Arg
 1345 1350 1355 1360
 Tyr Glu Asn Val Asn Ile Ala Thr Pro Gly Leu Ala Phe Asn Arg Tyr
 1365 1370 1375
 Arg Ala Gly Ile Lys Ala Asp Tyr Ser Phe Lys Pro Ala Gln His Ile
 1380 1385 1390
 Ser Ile Thr Pro Tyr Leu Ser Leu Ser Tyr Thr Asp Ala Ala Ser Gly
 1395 1400 1405
 Lys Val Arg Thr Arg Val Asn Thr Ala Val Leu Ala Gln Asp Phe Gly
 1410 1415 1420
 Lys Thr Arg Ser Ala Glu Trp Gly Val Asn Ala Glu Ile Lys Gly Phe
 1425 1430 1435 1440
 Thr Leu Ser Leu His Ala Ala Ala Lys Gly Pro Gln Leu Glu Ala
 1445 1450 1455
 Gln His Ser Ala Gly Ile Lys Leu Gly Tyr Arg Trp
 1460 1465